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The Need for Long-Range Gunnery

by Major Paul D. Smith

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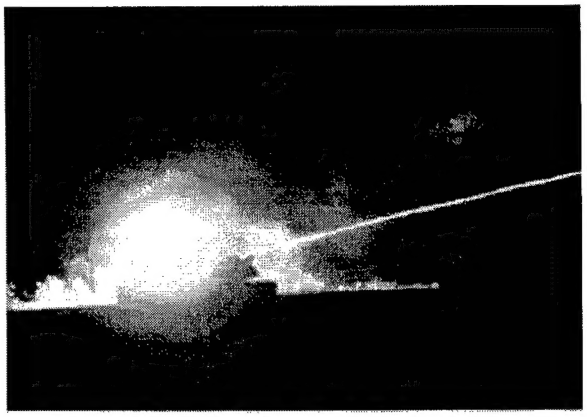

During the Gulf War, many gunners did what they were never trained to do, successfully engaging targets at ranges 50 percent greater than they encountered in training.

In fact, half of all KE shots were at ranges exceeding the typical maximum encountered in training.

Isn't it time to train for this?

One of the many lessons learned from DESERT STORM was our ability to engage and hit targets at ranges well beyond what is currently in our gunnery tables. The purpose of this article is to raise the long-range gunnery issue and to determine if we need to begin to train long-range gunnery.

Crews frequently engaged at ranges greater than 3,000 meters. "After-action reviews disclosed the median range of kinetic energy (KE) engagements was 2,170 meters. Additionally, 50 percent of all KE shots were between 2,000 and 3,000 meters. Currently most training engagements are 2,000 meters or less."[1]

These facts highlight the need to correct a gap in our current training ammunition, as compared to our service ammunition. They also highlight a training deficiency - currently, we do not train any long-range gunnery skills to any of our crews, let alone our best crews. This deficiency needs to be corrected if we are to train as we fight. Long-range gunnery is an art we need to practice and perfect before we go to war.

On 29 June 1994, Albert H. Pomey (ORSA), 5/16 Cav at Ft. Knox published a study that reveals some very interesting facts about long-range gunnery. The principal conclusions of the study were:

- The upper limit for a stationary M1A1 firing M865PIP against stationary frontal tank targets is 2,000 meters.
- The upper limit for a stationary M1A1 firing M865PIP against constant-velocity, full-size, moving targets is 2,500 meters.
- Firing stationary engagements with the fire control system in emergency mode does not improve accuracy, compared to firing in normal mode.
- The 1/2-target-form adjustment improves accuracy only slightly using M865PIP ammunition at 2,680 meters.
- A more accurate training round, with an improved tracer, is needed to train long-range gunnery. As the study indicates, before we can begin to train in long-range gunnery, we need a round that will support this.

Even the U.S. Army Armor School (USAARMS) pamphlet, *Long-Range Gunnery*, which was developed for our forces deployed in South West Asia (SWA), cited a need for a long-range shooter. In the pamphlet two important points were raised.

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- A "sniper tank" concept for firing at extended ranges, meaning 3,000 meters and beyond.
- A firing tank with a dedicated sensing tank can improve accuracy at extended ranges by using 1/2-target adjustments following a miss. If the USAARMS can establish a need for a long-range shooter during a time of war, why don't we train for this now?

Our current gunnery doctrine also needs to change to support the long-range gunnery concept. Currently it supports engagements at closer ranges because we have greater chance of success at ranges of 1,500 to 2,000 meters, depending on the tactical situation. However, there may be situations where a crew can engage at extended ranges of 3,000 to 4,000 meters in support of a tactical situation. If we haven't trained some "sniper" crews to accomplish this difficult task, we are asking for failure.

As we know, commanders will have to carefully select the sniper tanks. Here are some criteria on which to measure selection of crews:

- Past gunnery performance, along with the crew's gunnery accuracy.
- The crew's ability to thoroughly understand the fire control system and its operation.
- The crew must have the knowledge and discipline to perform meticulous prepare-to-fire checks, as well as boresighting.

A successful long-range gunnery will mainly depend on three items:

- Reticle lay
- Sight-to-target relationship
- Sensing.

Sensings are critical to a successful long-range engagement. Members of the firing crew may be able to sense their own rounds. However, there will be times when this is not possible because of battlefield obscuration and weather, when long-range gunnery sensings will have to come from the wingman or another sensing tank. "Because of the effects of shimmer and refraction, elements conducting long-range engagements should seek an elevated firing position. Usually, ten meters of elevation will negate the effects of refraction and help reduce the amount of heat shimmer."[2]

The tank crewmen on the sensing tank must understand the fire plan to ensure they are sensing the correct target. They must be disciplined and trained to look at the target without being influenced by other rounds and tracers in the target area. Most importantly, the sensing tank must be able to give a quick, clear, and precise sensing. As we know, sensings are not easily performed, and require a great deal of training to be performed correctly. They are difficult for the sensing tank, let alone the firing tank. The time to practice these tasks is not when we are issued service ammunition and rolling out the gate.

The sight picture the gunner takes up must be meticulously center of mass. Once the round is fired, the gunner must maintain the sight picture, attempting to sense his own round and making a mental note of the strike of the round. "At extended ranges, it may require more than one hit to achieve the desired effect on the target. In case of a first-round hit, the crew should re-engage using the same sight picture."[3] The laser rangefinder return is also critical at extended ranges, where "either all, or a large portion, of the target will be inside the GPS one-mil aiming circle. At those ranges, LRF beam divergence will spill over the target, giving incorrect returns. If the line of sight of the firing vehicle is obstructed, first return logic should be used."[4] If the gunner has laid on the target correctly and missed, he could make a 1/2-target-form adjustment based on the sensing received. However, the Fort Knox study cited in the notes has indicated that there may be no benefit to making sight adjustments after a sensed miss. This is because most misses are due to round-to-round dispersion, and sight corrections will not correct this problem.

Because the kinetic training energy round (M865PIP) was designed to lose its velocity quickly, and

velocity loss degrades accuracy, we are unable to train on long-range gunnery with our current rounds. I feel we need to modify an existing round to enable our crews to engage a target at 3,000 meters with a probability of hit of 50 percent or greater.

Let's talk about three of the methods of calibration that can be used - fleet zero, one-time zero, and multi-occasion zero. In Ft. Knox's *Long Range Gunnery Test Results,* dated 29 June 1994, the zeroing methods were evaluated with the following results using 865PIP:

- The fleet zero method only had a hit ratio of .35 at 2,680 meters and a even worse hit ratio of .02 at 3,450 meters. As one can tell, the fleet zero method is very ineffective for long-range gunnery, considering that the training goal is to give the crew at least a 70 percent chance of hitting a target with up to two rounds. With this in mind, the probability of hit must be about .50.
- The one-time zero performed better, with a hit ratio of .73 at 2,670 meters, but dropped off dramatically at 3,450 meters to .08. The Ft. Knox study indicates that the large drop-off could be attributed to the limited number of tanks and rounds fired: "If we fired more tanks and more rounds, it is probable the 2,680 meter hit ratio would have decreased, while the 3,450 meter hit ratio would have increased."[5]
- The multi-occasion zero was by far the best of the methods tested. The results show an increase in the hit ratios at both 2,680 meters with a hit ratio of .57, and 3,450 meters, with a hit ratio of .43. The drawback to the multi-occasion zero is that it requires a great deal more ammunition and range time. In the Ft. Knox test, the zero required five days on the range and 25 rounds per tank.

Long-range gunnery is an opportunity we are missing. It is a skill that needs to be trained in order to be mastered in a time of war. With the increase in the range of all other weapon systems, it is imperative that we expand the training envelope to improve the lethality of our tank system, as well as build our soldiers' confidence in the system. A greater stand-off range is critical to force protection. We all have used the sniper tank in that key hole position at the CTC; now we need to incorporate it in our gunnery program and formally recognize it.

Notes

[1]*Long-Range Gunnery Test Results*, by Albert Pomey, 29 June 1994, p. 2.

[2]*Long-Range Gunnery*, Ft. Knox, Ky., 29 Jan 1991, p. 2.

[3]Ibid.

[4]Ibid.

[5]Pomey, p. 8.

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